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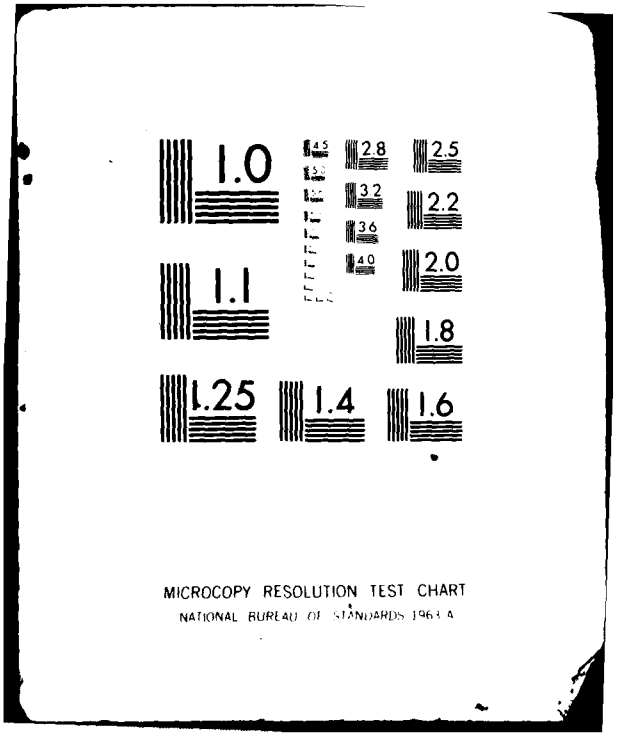
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ANNUAL REPORT
MECHANICAL PROPERTIES DATA CENTER

FEBRUARY 1982

HAROLD MINDLIN, MANAGER
HAROLD HUCEK
ROSS GUBIOTTI
BATTELLE-COLUMBUS
Columbus, Ohio

ANNUAL REPORT — CONTRACT DLA900-79-C-0539

Prepared for

ARMY MATERIALS AND MECHANICS RESEARCH CENTER
Watertown, Massachusetts 02172

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This report summarizes MPDC activities for the period 1 January 1981 through 31 December 1981, a total of 12 months, under Contract DLA900-79-C-0539. It provides a summary of the scope, objectives, and organization of MPDC, its information processing products, and services, and a discussion of management objectives. The report focuses on the accomplishments and operation of the mechanical properties numeric database and the continuation of the products and services of the Center.

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ABSTRACT

SUMMARY

The operation of the Mechanical Properties Data Center (MPDC) was undertaken by Battelle's Columbus Laboratories under Contract No. DLA900-79-C-0539, effective 1 January 1979. Prior to the award of this contract to Battelle, the Center was operated by another contractor since its inception in 1960. The contract for the continued operation of MPDC has not been renewed; hence, as of 1 January 1982, MPDC has not been in operation.

This full-service Center was sponsored by the Department of Defense as one of several Information Analysis Centers (IAC) providing scientific and technical information and data on selected materials of interest to the DoD and the technical community at large. This Center is primarily concerned with the maintenance of a mechanical properties numeric database on high-strength metals and alloys.

During this third year, efforts were directed toward the maintenance of all products and services for the Center. The conversion of the numeric mechanical properties data to the Battelle system had reached a level in 1980 to permit a redirection of efforts toward the input of new data in 1981.

Some specific tasks that were completed in 1981 are:

(1) Reformatting and reprinting of the "Alloy Cross Index"

(2) Initiation of the use of data sheets

(3) Data review and extraction from MPDC/MCIC documents

(4) Continued integration of the MCIC/MPDC bibliographic files to avoid duplication

(5) Development of database user-oriented online plotting and reporting routines.

The sales and maintenance of the Handbooks were continued without interruption and with an increase in sales income. Technical inquiries were handled successfully using the resources of MPDC and MCIC.

During the operation of this Center, the major accomplishment has been the conversion of the database from a batch system to a flexible, online user-oriented system, with user-available plotting and reporting routines. The "Alloy Cross Index" was reformatted and reprinted. Also, the "Aerospace Structural Metals Handbook" and the "Structural Alloys Handbook" were continued as widely accepted, authoritative sources of reliable data on aerospace and related materials.

PREFACE

This report was prepared by the Mechanical Properties Data Center (MPDC) which was operated by Battelle's Columbus Laboratories, 505 King Avenue, Columbus, Ohio 43201, under Contract DLA900-79-C-0539. The MPDC program was administered under the direction of the Defense Technical Information Center (Mr. James F. Pendergast), Defense Logistics Agency, with the technical supervision by the Army Materials and Mechanics Research Center, Watertown, Massachusetts (Mr. David W. Seitz, Contracting Officer's Technical Representative). Contractual matters are administered by the Defense Electronics Supply Center (Ms. Sara Williams), Dayton, Ohio.

This annual report covers the period of work from 1 January through 31 December 1981. The Twelfth Quarter (October 1981 through December 1981), 1981 annual, and combined 1979/1981 statistics are also included.

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and

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(October through December, 1981)

on the

OPERATION OF THE MECHANICAL PROPERTIES DATA CENTER

to

ARMY MATERIALS AND MECHANICS RESEARCH CENTER

INTRODUCTION

This Annual Report covers the third year of operation of the Mechanical Properties Data Center (MPDC). The current contract, initiated at Battelle's Columbus Laboratories on January 1, 1979, covered a maximum of five years. The contract for the optional two years has not been renewed; hence, as of 1 January 1982, MPDC is no longer in operation. This full-service Information Analysis Center was sponsored by the Department of Defense with technical direction from the Army Materials and Mechanics Research Center (AMMRC) and administrative management by the Defense Technical Information Center (DTIC) at the Defense Logistics Agency (DLA).

With the completion of the conversion of the majority of the data to the Battelle Database Management System (BASIS) and the completion of the cleanup of the index terms, efforts during 1981 were focused on:

- Reformatting and reprinting of the "Alloy Cross Index" to facilitate the use of the Index and reduce the number of pages. This is a computer-generated document related to the numeric database.

- Development of the data input sheets. This task was completed and the forms were used for abstracting new data.

- Review of MPDC documents for data extraction and subsequent entry into the numeric database.

- Development of online plotting and reporting routines to facilitate access and retrieval for the database user.

As indicated in previous progress reports, during the conversion of the database to BASIS, one very important problem was identified; i.e., the quality of the data in the system. While all data were basically correct, the data require review, analysis, and correction to provide the degree of confidence needed for an online system. Also, it appears many records can be combined to reduce the size of the database and, hence, decrease search and retrieval time.

Although unanticipated time and effort were required for the database conversion, the sales and maintenance of the two major Center Handbooks *(Aerospace Structural Metals Handbook* and *Structural Alloys Handbook)* were continued. As in previous years, income from the sales of these two Handbooks increased over previous years.

Statistical data for the operation of the Center are presented in Appendix C.

Scope and Purposes of MPDC

The objective of MPDC's operation was to increase the productivity of scientists, engineers, and technicians engaged in scientific and engineering programs for the Department of Defense (DoD). As with other government-funded IACs, the services and products of MPDC were available to all U.S. government agencies and their contractors and to the industrial and academic communities in the private sector.

The materials within MPDC's competence and concern included structural materials (primarily high-strength metals) for DoD applications and uses in the aerospace and defense industries. The Center collected and provided its users with mechanical properties and related materials characterization data for many alloy systems under a variety of test conditions.

Organization of the MPDC Program

The Mechanical Properties Data Center was assigned to the Materials Information Program Office, Harold Mindlin, Manager, of Battelle's Columbus Laboratories. Because of the similarities in scopes, management of MCIC and MPDC was assigned to the manager of that Program Office to ensure cost-effective operation of both Centers. This was accomplished through avoidance of duplication of efforts in the two Centers and the effective utilization of systems and procedures established and optimized by MCIC staff. During the year reported herein, the equivalent of more than three full-time engineers, computer and information specialists, and support personnel were involved in undertaking the functions of the Center.

Key contributors to the operation of MPDC, their Departments, and functions were as follows:

Personnel	Function	Department
Harold Hucek Rose Leibbrand	Coordination and management of marketing, promotion, and publications	Materials Computer, Information Systems and Education
Ross Gubiotti Keith Smoak Suk Y. Cho Kimberly Koehl	Database and related programming	Computer, Information Systems and Education
Helen Pestel	Coordination of Information Services	Computer, Information Systems and Education
Dr. F. R. Morral	Input to SAH	Materials
R. Rungta	Technical review of data and abstracting	Transportation and Structures

Utilization of personnel from the various departments and technical areas provided the expertise needed for the operation of this Center.

INFORMATION OPERATIONS

The operation of MPDC entailed two basic operations relative to the acquisition and input of source information:

1. Acquisition and review of documents for inclusion in both the bibliographic and numeric databases

2. Extraction of mechanical properties numeric data from relevant documents and entering of that data into the computerized database.

Before these operations could be undertaken as "routine", the material received from the previous contractor had to be duplication checked against the MCIC collection and, where appropriate, tagged as MPDC references. With the completion of the major portion of the conversion of the existing data to the Battelle BASIS Database Management System, efforts were initiated to review current reports and abstract new data for eventual entry into the numeric database.

During this contract period, a flexible, user-oriented online database system for numeric mechanical properties was designed and established. If the proper resources had been available to complete the review, evaluation, and necessary modifications and corrections to the existing data, we believe this system could have been put online in late 1980. Unfortunately, this was not the case.

This section describes both the bibliographic and numeric database activities that were undertaken as part of the MPDC operation.

Bibliographic Data – Acquisition and Input

The information acquisition program for MPDC was coordinated with this same activity for the Metals and Ceramics Information Center (MCIC) in order to minimize the cost and duplication of this function for both programs. Incoming documents, screened with this in mind, were tagged for processing into the relevant Center and, in some cases, for processing into both Centers.

During the Twelfth Quarter, 937 documents were acquired and reviewed for input into the MCIC/MPDC Bibliographic Database on the Defense RDT&E Online System (DROLS). Of these, 807 (86.1 percent) were added to the Bibliographic Database. For MPDC, 87 (10.8 percent of those added to the MCIC/MPDC Bibliographic Database) were tagged for review by the mechanical properties specialists for possible input into the Numeric Database on the BASIS file. Corresponding values for the contract year are: 4,130 documents acquired; 3,572 (86.5 percent) documents added to the Bibliographic Database; and 382 (10.7 percent) tagged for review for the Numeric Database. A breakdown of the type and number of documents added to the Bibliographic Database and tagged for the Numeric Database is shown in Table 1.

MCIC Duplication Checking

During the three-year contract period the MPDC collection in the numeric data file was duplication checked against the MCIC collection. The documents not in MCIC but in MPDC were added to the MCIC collection during 1979 and 1980 by adding 697 records into the MCIC bibliographic file on DROLS. The remaining collection was retrievable in either the computerized database on DROLS or in the older manual files at MCIC. During 1980 and 1981 many of the records for MPDC documents in the manual file were indexed and added to the computerized file on DROLS. These records are retrievable by searching the DROLS system for the term "M--MPDC". As of Tab cycle 82-2, 1780 documents were tagged in the DROLS/MCIC file with this term. The breakdown of the types of records is as follows:

Added to MCIC from MPDC	697
In MCIC Computerized File on DROLS – MPDC Tag Added	700
Records Converted from MCIC Manual File to MCIC Computer File	380

It is estimated that approximately 1600 records from the MPDC Numeric File are in the MCIC Manual Files but not in the MCIC Computerized File on DROLS.

Database Operations

At the initiation of this program at Battelle, the database operations were divided into task areas needed to accomplish the database conversion and provide for other tasks to be handled by the Applied Information Systems and Data Management Section:

TABLE 1. BIBLIOGRAPHIC AND NUMERIC FILE INPUT

Document Type	MPDC/MCIC Bibliographic File Input				Documents Tagged for MPDC Numeric File			
	12th Quarter		Contract Year		12th Quarter		Contract Year	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Journal Articles	475	58.9	1,549	43.4	46	53.5	135	35.4
Technical Reports								
DoD								
Air Force	59	7.3	334	9.3	4	4.6	41	10.8
Army	46	5.7	182	5.1	5	5.8	16	4.2
Navy	67	8.3	301	8.4	6	7.0	36	9.5
Other	8	1.0	75	2.1	1	1.2	7	1.8
Non-DoD								
DoE/ERDA	27	3.3	160	4.5	6	7.0	32	8.4
NASA	43	5.3	162	4.5	7	8.1	29	7.6
Other	13	1.6	68	1.9	1	1.2	13	3.4
Technical Papers	58	7.2	702	19.7	8	9.3	69	18.1
Miscellaneous	11	1.4	39	1.1	2	2.3	3	0.8
Total	807	100.0	3,572	100.0	86	100.0	381	100.0
Three-Year Totals			10,989				1,399	

- Data Analysis and Reformat
  - System Analysis
  - Programming (Data Reformat)
  - Data Verification
- BASIS Conversion
  - Database Design
  - Conversion (Programming)
  - Data Validation
  - Updates
  - Report Generation (Programming)
- Database Maintenance
  - Cleanup
  - Updates
- Data Input Sheets
- SAH/ASMH Customer List
- MCIC Duplication Checking.

The (person-hour) efforts expended to accomplish these tasks during the Twelfth Quarter, the third year (1981) and the totals for this three-year contract are summarized in Appendix A. (Table A-1 also includes the general support for other computer-related operations discussed in this report.)

The problems hampering and delaying the online access to and implementation of this database have been discussed in detail in previous quarterly and annual reports.

Data Analysis and Reformat

During the course of this contract, approximately 75 percent of the data files received from the previous contractor were converted to the BASIS system. Conversion of the remaining data was deferred to provide resources for tasks that were given higher priorities.

BASIS Conversion

Efforts were undertaken to design and implement an interface that would provide the user direct capability for both online and offline plotting of retrieved data. The objective of this effort was to generate simple X-Y plots or X-Y plots with data transformations on a graphics terminal and on a hard-copy device.

Database Maintenance

Steps necessary for the input of new data into the numeric database were defined and initiated. During the year a technical specialist reviewed over 200 abstracts to determine which reports might contain useful and pertinent data. About 45 reports were screened in depth as possible data sources. Input sheets containing actual extracted data were prepared (where sufficient data were present) for future input into the numeric database.

Data Input Sheets

The input sheet design was completed, a test run was conducted, and sufficient data sheets were prepared to use for the extraction of numeric data from reports. The review was conducted by a Battelle researcher familiar with the requirements and acceptable practices for the reporting of numeric mechanical properties data. When required, modifications were made to the data sheets to cover data not explicitly defined.

The documentation and instructions for the keypunching or inputting of data into the database were initiated. The plan was to complete this after initial data inputting to get the response from the person actually doing the work. Activity on this task was suspended during the twelfth quarter.

SAH/ASMH Customer List

In order to maintain better control of inventory and sales, the ASMH/SAH Customer List Database was expanded for better control over the products being distributed. This expansion included monitoring the mailing and payment of invoices, products sales statistics, and inventory, in addition to the existing capability for the generation of mailing labels.

HANDBOOKS AND DATA BOOKS

Publications

The MPDC publications program consisted of three documents:

1. Aerospace Structural Metals Handbook (ASMH)
2. Structural Alloys Handbook (SAH)
3. Alloy Cross Index (ACI).

At the beginning of the contract, these documents were thoroughly evaluated to determine their value to the technical community and their propriety to the Department of Defense/MPDC mission. Because of its long-standing acceptance by the technical community, the ASMH was continued and updated on a quarterly basis. It was determined that the SAH served a sector of the DoD and related industries not directly involved in aerospace-related activities. Therefore, updating was continued on a semiannual basis.

The ACI was requested by a sufficient number of users that it was reprinted in a new format intended to provide more rapid retrieval of information. This Handbook has not been updated since 1978.

The sales of documents and status of the Handbooks are described in more detail in the following paragraphs.

Sales and Income

During the first quarter of 1981 and in December 1980, invoices were sent to all customers who have standing or automatic renewal orders for MPDC documents (approximately 500). These actions plus other promotional measures resulted in an actual income of $26,176 for the Twelfth Quarter of the contract as shown in Table 2. Included in that table is the summary of the 1981 sales. This income for the current quarter brings the 1981 annual income to $122,835.

Income from the sales of the ASMH, SAH, and ACI for the three years of this contract is summarized as follows:

1979	$ 71,501
1980	$107,529
1981	$122,835.

TABLE 2. INCOME FROM TWELFTH QUARTER AND ANNUAL SALES

Handbook or Document	Twelfth Quarter			1981		
	Number Sold	Supplements Sold	Income, $	Number Sold	Supplements Sold	Income, $
ASMH	25	44	13,430.82	85	593	74,592.92
SAH	13	18	10,945.50	56	251	39,214.00
ACI	13	–	1,799.72	120	–	9,028.32
Binders, Misc.*	3	–	–	10	–	–
Totals			26,176.04			122,835.24

*Misc. includes single supplements and replacements for handbook pages. Income included with appropriate Handbook.

Status of Publications

Although the MPDC contract has not been renewed, it is anticipated that the publication of the ASMH and SAH and their supplement service will be continued.

The continuation of the ASMH and SAH would benefit the DoD in both the short and long term. For example, approximately 1500 copies of the ASMH have been sold. A conservative estimate of the number of users would be 10 to 15 per handbook per year. Actually, handbooks available in

technical libraries (such as MCIC or Battelle) probably serve 50-100 engineers and technologists per year. If 4 hours are saved by each of 15 users per year, the 1500 handbooks would save 90,000 hours per year. At a conservative $40 per hour, this converts to $3,600,000 per year saved by the government through use of the ASMH alone. Similar logic could be used for the SAH.

The ACI is generated from the numeric database which is being discontinued. Therefore, publication of the ACI is also being suspended in 1982. If publication of the ACI is resumed, an extensive updating will be required; the last update was done prior to 1979.

Aerospace Structural Metals Handbook (ASMH). The ASMH has been available for distribution since March 1963. Since then it has established a reputation as a reliable source of data on properties of aerospace materials. The continuing supplementary service (four per year) updates previous chapters and adds new chapters for materials of interest to the aerospace community. Table 3 lists the supplements issued during 1981. The publication schedule was maintained reasonably well during this reporting year.

As noted in Table 3, two new and two revised chapters were included in the 1981 supplements. The supplement for the Twelfth Quarter will be mailed in mid-January 1982.

The alloys listed in Table 4, and not scheduled, will be evaluated and preparation of chapters will be assigned as funding permits and the contracting is resolved in 1982. Candidate materials for future supplements are shown in Table 5. During the First Quarter of 1982 this list of alloys will be reviewed.

TABLE 3. ADDITIONS TO AEROSPACE STRUCTURAL METALS HANDBOOK (ASMH) DURING 1981

Additions or Revision to the Handbook	Number of Pages(1)	Chapter Code	New, Revised	Supplement
MAR-M-246	32(2)	4216	N	Ninth Quarter
Inconel X-750	32(2)	4105	R	Tenth Quarter
310 Stainless Steel	39(2)	1305	R	Eleventh Quarter
Ti-10V-2Fe-3Al(2)	82(24)	3725	N	Twelfth Quarter

(1) Number of pages for supplements includes index, title, and instruction pages. The pages of nontechnical material included are indicated in ( ).

(2) To be mailed mid-January, 1982.

TABLE 4. PUBLICATION PLAN FOR THE AEROSPACE STRUCTURAL METALS HANDBOOK (ASMH) IN 1982

Alloy	Type of Chapter, New (N), Revision (R)	Scheduled Completion Date of Draft	Mailing Date	Remarks
AM-350, AM-355	R (Lula)	January 31, 1982	April 15, 1982	In technical editing & revision
AISI 4340	R (Kattus)	May 1, 1982	July 15, 1982	Last revision 12/63
Ti-5Al-2.5Sn	R (Shannon)*			Last revision 3/65
Inconel 600	R (Kattus)*			Last revision 3/67
AISI M-50	N (Brown)*			
MAR-M-247	N (Manson)*			
Aluminum-2224	N (K. Brown)*			
Aluminum-7150	N (K. Brown)*			
IN-738	N (Shannon)*			
IN-939	N (Kattus)*			
9Ni-4Co Steel	R (W. Brown)*			Last revision 3/71
Beryllium	R (W. Brown)*			Last revision 6/74
Aluminum 2124	R (Sessler)*			Last revision 6/76

*These chapters have been suggested by the author noted but subcontracts have not been issued.

TABLE 5. CANDIDATE MATERIALS FOR THE FUTURE SUPPLEMENTS FOR THE AEROSPACE STRUCTURAL METALS HANDBOOK

Aluminum Alloys

2036
2124
5182
7049
7075
7475
A357 (Casting)
A201.1 (Casting)

Titanium Alloys

Ti-11
Ti-2.0Cu
Ti-2Mo-8V-2Fe-3Al
Ti-10Mo-6Cr-2.5Al
Ti-10Mo-8V-2.5Al
Ti-15Cr-3Al-3Sn
Ti-6Al-2Sn-2Fe-2Cr-2Mo-0.23Si
Ti-5Al-5Sn-2Mo-0.2Si
Ti-5Al-5Sn-2Fe-4Mo-0.25Si
Ti-4.5Al-5Mo-1.5Cr
Ti-2.5Al-8Mo-4.5Cr

Nickel Base Alloys

Nimonic 90
Nimonic 115
Rene 95
MP 35 N
IN 792
Hastelloy – S
Incoloy – 903
NASA – 11B-7
NASA – 11B-11
Inconel 738
IN 939
Hastelloy C – 276
MA 754 (PM alloy)

Ferrous Alloys

E9310 Steel
10 Ni Steel
314 Stainless Steel
21-6-9 Stainless Steel
CG-27 Steel
CTX-1
18 Ni Maraging Steel (250)
Custom 450 PH Stainless

Miscellaneous Alloys

T-111 (Tantalum)
LOCKALLOY
UDIMET 500
C-355 (Cast)
TZM (Molybdenum)

Appendixes

Low-Cycle Fatigue

Structural Alloys Handbook (SAH). The SAH is directed toward the perceived needs of the non-aerospace, defense community, such as construction, machine tools, heavy equipment, automotive, and general manufacturing. Although some of the materials can be found in both the SAH and ASMH, the data in the SAH are primarily presented for the structural designer – with a minimum of metallurgical information regarding heat treatment, grain structure, etc. Battelle has continued the twice-yearly supplement service to serve the over 650 holders of the SAH.

During 1981 two chapters on precipitation hardening stainless steels were compiled and published by the MPDC staff. Publication plans and accomplishments are shown in Table 6.

Candidate materials for future SAH supplements, shown in Table 7, have been selected from responses received from SAH users.

Alloy Cross Index (ACI). The ACI is generated from a portion of the Numeric Database – which is now converted to the BASIS format. Extensive remodeling of the ACI eliminated extraneous materials. The new format resulted in a one-volume edition – rather than the two-volume set previously used. During 1981, the reformatting and revision of the ACI was completed and 120 copies were printed to fulfill the orders on hand.

STATE-OF-THE-ART STUDIES

During the three-year period of this contract, MPDC did not produce any state-of-the-art studies or reports (SOARs). The primary program efforts were directed toward the database and handbook activities; hence, resources were not available for SOARs. Each supplement to the ASMH or SAH was, in itself, a SOAR.

CRITICAL REVIEWS AND TECHNOLOGY ASSESSMENTS

(See previous section on "State-of-the-Art Studies". The status was the same for both tasks.)

INQUIRY SERVICES

Technical and Bibliographic

During the Twelfth Quarter five technical inquiries were received; during the third year of operation 31 technical inquiries were handled by MPDC. Only one of these was paid. (The inquiry sources are summarized in Appendix B.) In 1981, the total amount received for paid inquiries was $520. For the three-year operation of MPDC, inquiries produced income as follows:

TABLE 6. PUBLICATION PLAN FOR THE STRUCTURAL ALLOYS HANDBOOK (SAH) IN 1981 AND 1982

Material Covered	Number of Pages*	Type of Publication	Scheduled Mailing Date	Author	Remarks
Precipitation Hardened Stainless Steels 17-4PH, and 15-5PH	48(5)	New Chapter	June 15, 1981	BCL Author	First Supplement for 1981
Precipitation Hardened Stainless Steel 17-7PH	51(11)	New Chapter	Jan. 7, 1982	BCL Author	Second Supplement for 1981
Wrought Titanium		Selector Chart	June 15, 1982	BCL Author	First Supplement for 1982
Aluminum Alloys		New or Revised Chapter			Selected by Alum. Assoc. Second Supplement for 1982

*Pages of nontechnical material, instruction sheets, Table of Contents, etc., shown in ( ).

TABLE 7. CANDIDATE MATERIALS FOR FUTURE SUPPLEMENTS TO THE STRUCTURAL ALLOYS HANDBOOK

Material*	
1. High-Strength, Low-Alloy Steel	8. HY 180 Steel
2. Inconel 625	9. 5083, 5086 Aluminum
3. HY 80/100 Steel	10. 6063, 6364 Aluminum
4. 400, 405, 409 Stainless Steel	11. 5052 Aluminum
5. 316 Stainless Steel	12. 3003 Aluminum
6. 6Al-4V Titanium	13. Cast Magnesium
7. HY 130/140 Steel	14. 70-30 Brass

*Listing is in order of interest by users who returned evaluation forms in 1980 and 1981.

1979	$620
1980	$350
1981	$520

Some inquiries were intentionally referred to MCIC for handling. It is estimated that in 1981, approximately 30 inquiries fell into this category.

The total expenditure for the handling of all 31 MPDC technical and bibliographic inquiries in 1981 was $1384. This sum includes approximately $528 for management and estimating and $610 for no-charge inquiries which required approximately 12-1/2 person-hours for specialists to handle. This is an average of less than 1/2 hour per inquiry. For many of these inquiries it would have been more convenient to search the Numeric Database – but, because the cleanup of the technical data was not complete, responses were obtained from either a search of the MCIC and DTIC systems or use of various MPDC or MCIC Handbooks.

Nontechnical

Nontechnical inquiries were primarily concerned with the publications and general information about the Center. Less than $50 was expended to handle these inquiries.

CURRENT AWARENESS, MARKETING, AND PROMOTION

Current Awareness

No efforts were initiated in this area due to lack of adequate resources.

Promotion and Marketing

The MPDC Promotion and Marketing program, along with the Current Awareness program, was considered to be vital to the long-term well-being of the Center. Experience with many information centers at Battelle has shown that an important function of any center is to make people aware of the availability of the products and services of the center. Only when this vital function has occurred can the government realize the tremendous savings possible through proper use of data and information available through a full-service Information Analysis Center.

The limited marketing and promotion program had been carefully formulated to utilize our limited resources while maximizing the use of the Center. Whenever possible, the availability of MPDC's product and services was announced in combined MPDC/MCIC efforts. The modest marketing effort in 1981, listed in Table 8, resulted in a continued increase in sales income.

The MPDC and MCIC publications have been combined in one list which was included with each publication (about 700 each quarter) mailed through the Centers. This is reducing overall mail costs without increasing MCIC mail costs. The Publications List was mailed to one specialized mailing list.

Our MCIC representatives in India and Japan are also handling MPDC publications.

TABLE 8. SUMMARY OF MPDC PROMOTIONAL EFFORTS DURING 1981

Date	Type of Promotion	Remarks
Dec. 1980 and Jan. 1981	Letter Invoices	Sent to current subscribers to ASMH & SAH Supplement Services who had not prepaid (approximately 500)
Feb. 17, 1981	Special mailing of Materials Information Publication (MIP) brochure	This brochure describing the Center's (MPDC) services and publications was sent to the Machinability Data Center customer list (approximately 17,500)
Mar. 26, 1981	Deliver a paper describing MPDC	Paper presented by Ross Gubiotti at the National Online Conference in New York, NY
Feb. 27, 1981	Insert in MCIC Current Awareness Bulletin (CAB)	MIP brochure inserted with the CAB (approximately 4,000)
Mar. 23-26, 1981	Display and handout at conference	MIP brochure available at display at WESTEC, ASM/SME Conference in Los Angeles (approximately 50,000 attendees)
June 16, 1981	Presentation of MPDC capabilities	Presented by H. Mindlin at Workshop on Substitution Preparedness, Nashville, TN

Meetings Attended

During 1981, the following travel was related to the operation or publicizing of the Center:

Personnel	Date(s)	Destination	Purpose
H. Mindlin	14 Jan	Boston, MA	COTR. Project discussions
H. Mindlin	16 Jan	Washington, DC	DLA. Project discussions
H. Mindlin	24 Feb	Cleveland, OH	NASA-Lewis. Handbooks
H. Mindlin	5 Mar	Washington, DC	Aluminum Assoc. Presentation and discussion of database activities
H. Mindlin	12 Mar	Philadelphia, PA	ASTM, Handbooks
R. Gubiotti	26 Mar	New York City, NY	Nat'l Online Conf. Paper
H. Mindlin	9 Jun	Washington, DC	NMAB, MPDC Discussion
H. Mindlin	14-17 Jun	Nashville, TN	MPDC/MCIC capabilities relative to Substitution Preparedness
H. Mindlin	15 Jul	Washington, DC	DTIC. Planning of IAC Mgrs. Mtg.
H. Mindlin	8-10 Sep	Munich, West Germany	AGARD/NATO Information needs meeting
H. Mindlin	29 Oct	Washington, DC	DTIC. Project discussions
H. Mindlin	11 Nov	Santa Barbara, CA	MMCIAC. Database
H. Mindlin	12 Nov	Thousand Oaks, CA	Rockwell. IAC capabilities
H. Mindlin	19 Nov	Boston, MA	COTR. Project discussions
H. Mindlin	8-10 Dec	Washington, DC	IAC Mgrs. Meeting

It should be noted that although all of the above trips had some content related to MPDC, all travel expenses were not accrued to MPDC.

Visitors

The following visitors were at MPDC during 1981 to observe and discuss various operations, products, and/or services of the Center.

Person	Date(s)	Affiliation	Purpose
T. Owada	16 Jan	Neutrino/Japan	Publications
Mrs. E. El-Shooky	20 Jan	Egypt	MPDC Activities
W. F. Brown, Jr.	15 Apr	NASA-Lewis	ASMH
Dr. E. Pedersen	15 May	Alborg U., Denmark	IACs, general interest
Capt. D. A. Joslyn, Jr.	May	USAF-FTD, WPAFB, OH	Info – Handbooks
B-TIP Program Visitors (approximately 30)	11 Jun	Various Companies	MPDC Database Operations
F. Shober	20 Jun	Westinghouse-Hanford	Data Activities
J. Palmer, L. Hampton	13 Jul	Anaconda Aluminum	Database Activities
Industrial Visitors (7)	12 Aug	Japanese Companies	IAC Activities
J. Graham, E. Ripling	1 Oct	NMAB	IAC Activities
S. M. Sachdev	6 Oct	Allied Publishers/India	ASMH/SAH
P. Wu	30 Oct	STAG, Republic of China	Center Activities
M. Ogawa, M. Hirai	23 Nov	Fujitsu, Japan	Database Activities
R. McNamara, M. Imos	17 Dec	Gen. Dynamics-Convair, San Diego	IAC Activities

INCOME AND COST RECOVERY

In compliance with current DoD policy, charges for information services and products have been made when appropriate. The objective of the service-charge program is the achievement of income for products and services equal to at least 50 percent of the initial contract funding. The income is used to offset costs related to operations, products, and services and to expand total services to DoD and the technical community.

The income achieved by MPDC is summarized as follows:

	Twelfth Quarter	1981	1980	1979	3-Year Totals
ASMH	$13,430.82	$ 74,592.92	$ 72,124.05	$48,380.99	$195,097.96
SAH	10,945.50	39,214.00	32,718.63	21,724.52	93,657.15
ACI	1,799.72	9,028.32	2,686.00	1,395.00	13,109.32
Inquiries	149.79	519.79	349.50	620.00	1,489.29
	$26,325.83	$123,355.03	$107,878.18	$72,120.51	$303,353.72
Percent of Contract Funding		58.7	51.4	34.3	48.2

As noted in the foregoing summary, the total income for 1981 was 58.7 percent of the basic funding of $210,000. The total income for the three-year operation of MPDC was 48.2 percent of the basic funding ($630,000). With only a modest marketing effort, the sales income was increased from 34.3 percent to 58.7 percent in three years. It is evident that the Handbooks offered by MPDC are wanted by the technical community.

The Contract Status Reports for the Twelfth Quarter, 1981 Annual, and three-year cumulative are presented in Appendix C.

Mailings

As required by the basic contract, the total expenditures for postal charges are:

Twelfth Quarter	$ 1,364.68
Annual (1981)	$ 5,577.29
Contract Total	$12,256.48.

The type and number of individual items that were mailed are given in Table 9.

TABLE 9. TWELFTH QUARTER AND ANNUAL (1981) MAIL SUMMARY

Item	1st Class/ Air Mail	3rd Class	4th Class Book Rate	Air Printed Matter
		a. 12th Quarter		
Handbook, Boxes			50	
Supplements, Flats		470(1)		67
Letter Size – Announcements, Invoices and Miscellaneous	101			
		b. 1981 Summary		
Handbooks, Boxes			480(2)	
Supplements, Flats		2,294(1)		530
Letter Size – Announcements, Invoices and Miscellaneous	820			

(1) Includes mailing of supplements to the SAH and ASMH.
(2) Includes boxes mailed Federal Express, Air Special 4th Class, Parcel Post, Mail Sacks.

FUTURE PLANNING

The decision not to renew the contract to continue operation of the Mechanical Properties Data Center negates the need for this section. It is anticipated that the maintenance of the *Aerospace Structural Metals Handbook* and the *Structural Alloys Handbook* will be continued on another contract.

We believe that the Mechanical Properties Database, which had been in existence since 1960, was successfully converted from a batch, contractor-operated system to an online, user-oriented and eventually, user-operated system with maintenance by the contractor. The capabilities of the Battelle system were never realized because of a lack of resources to assure that the data were technically correct and efficiently handled within the system. Hence, we recommend that consideration be given to reinstatement of the numeric database in the future in an expanded form that could be useful to materials and design engineers and scientists.

ACKNOWLEDGEMENTS

The list of people who have contributed to and assisted MPDC through its three years of operation is long – but several people deserve recognition for their individual contribution:

Ms. Francis Burke, DESC

Ms. Sara Williams, DESC

Mr. Sam Valencia, AMMRC (retired)

Mr. Ray Farrow, AMMRC

Mr. David Seitz, AMMRC

Mr. Joseph L. Blue, DLA

Mr. Hugh Sauter, DLA/DTIC

Mr. James Pendergast, DLA/DTIC.

APPENDIX A

SUMMARY OF PERSON-HOUR EXPENDITURES FOR DATABASE OPERATIONS

APPENDIX A. PERSON-HOUR EXPENDITURES FOR DATABASE OPERATIONS

		1979-1980 Totals		Twelfth Quarter					1981 Totals		3-Year Totals	
		Subtask	Task	Oct	Nov	Dec	Subtask Total	Task Total	Subtask	Task	Subtask	Task
Numeric Data Base	1. Data Analysis/Reformat		849									849
	2. BASIS Conversion		2242					317		771		3013
	a. System Design	198		58	36	20	114		296		494	
	b. Programming (Conversion)	783									783	
	c. Data Validation	155									155	
	d. Updates (Test System)	546									546	
	e. Programming (Reports)	560		104	99	–	203		475		1035	
	3. Database Maintenance		489							141		630
	a. Cleanup	437									437	
	b. Updates	52							141		193	
	4. Data Input Sheets		39	21	31	38		90		319		358
General Support	5. SAH/ASMH		454	25	75	21		121		261		715
	6. ACI Thesaurus		115							258		373
	7. MCIC Checking		988	34	36	19		89		152		1140
	8. Management		541	47	40	34		121		415		956
	TOTALS		5717	289	317	132		738		2317		8034

APPENDIX B

SUMMARY OF MPDC TECHNICAL INQUIRIES

APPENDIX B. SUMMARY OF MPDC TECHNICAL INQUIRIES

Number	Date Received 1981	Inquirer	Date of Response	Charge
62	6 Jan	H. Kunsman GARD, GATX	6 Jan	No
63	7 Jan	R. Barry Cincinnati, Inc.	7 Jan	No
64	27 Jan	H. Sabbagh Analytics, Inc.	28 Jan	No
65	6 Feb	P. Frost BCL	6 Feb	No
66	18 Feb	R. Mousseau F. J. Lamb Co.	18 Feb	No
67	27 Feb	R. Miller Maple Heights, Ohio	27 Feb	No
68	3 Mar	K. E. Thompson Hughes Aircraft	3 Mar	No
69	4 Mar	R. Warren Allegheny Ballistics Lab.	4 Mar	No
70	24 Mar	R. Evans Piper Aircraft	27 Mar	No
71	30 Mar	M. Bernoit Counselors for Mgmt.	30 Mar	No
72	31 Mar	H. Hime U.S. Coast Guard	1 Apr	No
73	7 Apr	N. Frye BCL	8 Apr	No
74	10 Apr	J. Frye RMI, Inc.	14 Apr	No
75	27 Apr	S. Harvey Metcut	27 Apr	No
76	27 Apr	D. Breetz GE – Louisville	27 Apr	No
77	8 May	E. J. Blau Johns Hopkins University	8 May	No
78	11 May	C. Williamson TRW	17 May	No

APPENDIX B. (Continued)

Number	Date Received 1981	Inquirer	Date of Response	Charge
79	5 Jun	L. Rosecrans Rocketdyne	8 Jun	No
80	18 Jun	R. Freeman Grumman	18 Jun	No
81	18 Jun	J. Shah American Standard	18 Jun	No
82	16 Jul	M. Gormley American Can	20 Jul	No
83	4 Aug	D. Seitz AMMRC	4 Aug	No
84	10 Aug	H. Nee Sprague Electronics	10 Aug	No
85	25 Aug	A. Dooley Atlantic Research	25 Aug	No
86	18 Sep	A. Feldman NBS	18 Sep	No
87	28 Sep	Dr. M. Rice Systems, Science and Software	12 Oct	Yes
88	2 Oct	W. Degnan Sikorsky	5 Oct	No
89	14 Oct	L. Nguyen NRC/Canada	15 Oct	No
90	5 Oct	A. Mikus GTE Sylvania	19 Oct	No
91	27 Oct	J. Hakkio Cleveland Pneumatic	28 Oct	No
92	1 Dec	W. Walkup McCartney Manufacturing	3 Dec	No

APPENDIX C

CONTRACT STATUS REPORTS

APPENDIX C

TWELFTH QUARTER AND CUMULATIVE CONTRACT STATUS REPORTS

Footnotes for Tables C-1, C-2, C-3

(a) According to Battelle job classifications.

(b) Cost of staff time directly related to MPDC operation.

(c) Costs other than direct staff time.

(d) Combined MCIC/MPDC documents.

(e) Tagged for review for possible numeric database input.

(f) ASMH – 1 chapter 58 pages + 24 pages revised material.
SAH – 1 chapter 40 pages + 11 pages revised material.

(g) Travel expenses for all meetings not totally accrued to MPDC.

(h) Reprinting of ASMH and SAH completed in Ninth Quarter.
Printing of revised ACI completed in Tenth Quarter (806 pages, 120 copies).

(i) ASMH – 1 – 28 pages + 2 pages revised material; 1 – 58 pages + 24 pages revised material.
SAH – 1 – 41 pages + 2 pages revised material; 1 – 40 pages + 11 pages revised material.

(j) ASMH – 1 – 30 pages + 2 pages revised material.

(k) Included with Technical Inquiries.

(l) ASMH – 13 chapters, 1 Addendum.
SAH – 7 chapters.

(m) ASMH – 5 chapters.

TABLE C-1. TWELFTH QUARTER STATISTICS

INFORMATION ANALYSIS CENTER CONTRACT STATUS REPORT	NAME OF INFORMATION ANALYSIS CENTER: Mechanical Properties Data Center				QUARTER ENDING: December 31, 1981			CUMULATIVE THRU
AREA TITLE	OUTPUT UNITS PRODUCED	MANHOURS EXPENDED (a)			COSTS INCURRED			INCOME
		PROFESSIONAL	NON PROFESSIONAL	TOTAL	DIRECT (b)	INDIRECT (c)	TOTAL	
1 ACQUISITION AND INPUT OF SOURCE INFORMATION		461	323	784	9,616	22,025	31,641	
a. DOCUMENTS ACQUIRED	937 (d)							
b. DOCUMENTS REVIEWED	937							
c. DOCUMENTS CATALOGED	87 (e)							
2 TECHNICAL INQUIRY RESPONSES PROVIDED	5	4	2	6	144	198	342	149.79
3 BIBLIOGRAPHIC INQUIRY RESPONSES PROVIDED	(k)	5	–	5	101	135	236	–
4 HANDBOOKS/DATA BOOKS COMPLETED		179	572	751	4,437	27,921	32,358	26,176.04
a. NEW CHAPTERS/PAGES COMPLETED (f)	2/133							
b. REVISED CHAPTERS/PAGES COMPLETED	–							
c. DATA SETS COMPILED	–							
5 STATE-OF-THE-ART STUDIES COMPLETED	–	–	–	–	–	–	–	–
6 CRITICAL REVIEWS AND/OR TECHNOLOGY ASSESSMENTS COMPLETED	–	–	–	–	–	–	–	–
7 CURRENT AWARENESS AND PROMOTION EFFORTS		–	104	104	988	1,604	2,592	–
a. NUMBER NEWSLETTERS AND/OR ANNOUNCEMENTS PUBLISHED	–							
b. [illegible] MEETINGS, CONFERENCES, C SUPPORTED (g)	5							
d OTHER Cost of Facilities Adjustment, 11th Quarter	–	–	–	–	–	*(71)	*(71)	–
9 MANAGEMENT AND SUPPORT		74	52	126	2,868	4,538	7,406	
10 UNASSIGNABLE INDIRECT COSTS (Contractual fee)		–	–	–	–	7,892	7,892	
11. TOTAL		723	1,053	1,776	18,154	64,242	82,396	26,325.83

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EDITION OF JUN 72 IS OBSOLETE

TABLE C-2. 1981 ANNUAL STATISTICS

INFORMATION ANALYSIS CENTER CONTRACT STATUS REPORT	NAME OF INFORMATION ANALYSIS CENTER: Mechanical Properties Data Center				QUARTER ENDING		CUMULATIVE THRU: December 31, 1981
AREA TITLE	OUTPUT UNITS PRODUCED	MANHOURS EXPENDED(a)			COSTS INCURRED			INCOME
		PROFESSIONAL	NON-PROFESSIONAL	TOTAL	DIRECT(b)	INDIRECT(c)	TOTAL	
1. ACQUISITION AND INPUT OF SOURCE INFORMATION		1,435	824	2,259	28,030	61,691	89,721	
a. DOCUMENTS ACQUIRED	4,130(d)							
b. DOCUMENTS REVIEWED	4,130							
c. DOCUMENTS CATALOGED	382(e)							
2. TECHNICAL INQUIRY RESPONSES PROVIDED	31	15	3	18	470	631	1,101	519.79
3. BIBLIOGRAPHIC INQUIRY RESPONSES PROVIDED	(k)	6	–	6	121	162	283	–
4. HANDBOOKS/DATA BOOKS COMPLETED (h)		914	2,450	3,364	20,548	133,328	153,876	122,835.24
a. NEW CHAPTERS/PAGES COMPLETED (i)	4/206							
b. REVISED CHAPTERS/PAGES COMPLETED (j)	1/32							
c. DATA SETS COMPILED	–							
5. STATE-OF-THE-ART STUDIES COMPLETED	–	–	–	–	–	–	–	–
6. CRITICAL REVIEWS AND/OR TECHNOLOGY ASSESSMENTS COMPLETED	–	–	–	–	–	–	–	–
7. CURRENT AWARENESS AND PROMOTION EFFORTS		4	499	503	4,484	6,347	10,831	–
a. NUMBER NEWSLETTERS AND/OR ANNOUNCEMENTS PUBLISHED	1							
b. NUMBER MEETINGS, CONFERENCES, ETC SUPPORTED (g)	15							
8. OTHER Cost of Facilities Adjustment	–	–	–	–	–	(71)	(71)	–
9. MANAGEMENT AND SUPPORT		262	269	531	10,137	16,663	26,800	
10. UNASSIGNABLE INDIRECT COSTS		–	–	–	–	18,350	18,350	
11. TOTAL		2,636	4,045	6,681	63,790	237,101	300,891	123,355.03

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TABLE C-3. TOTAL THREE-YEAR STATISTICS

INFORMATION ANALYSIS CENTER CONTRACT STATUS REPORT	NAME OF INFORMATION ANALYSIS CENTER: Mechanical Properties Data Center				QUARTER ENDING		CUMULATIVE THRU: December 31, 1981	
AREA TITLE	OUTPUT UNITS PRODUCED	MANHOURS EXPENDED (a)			COSTS INCURRED			INCOME
		PROFESSIONAL	NON PROFESSIONAL	TOTAL	DIRECT (b)	INDIRECT (c)	TOTAL	
1 ACQUISITION AND INPUT OF SOURCE INFORMATION		2,319	1,890	4,209	52,664	104,769	157,433	
a. DOCUMENTS ACQUIRED	12,361(d)							
b. DOCUMENTS REVIEWED	12,361							
c. DOCUMENTS CATALOGED	1,400(e)							
2. TECHNICAL INQUIRY RESPONSES PROVIDED	100	87	26	113	2,316	2,570	4,886	1,489.29
3. BIBLIOGRAPHIC INQUIRY RESPONSES PROVIDED	(k)	15	1	16	295	381	676	–
4 HANDBOOKS/DATA BOOKS COMPLETED (h)		2,797	6,674	9,471	79,843	346,605	426,448	301,864.43
a. NEW CHAPTERS/PAGES COMPLETED (l)	20/602							
b. REVISED CHAPTERS/PAGES COMPLETED (m)	5/200							
c. DATA SETS COMPILED	–							
5. STATE-OF-THE-ART STUDIES COMPLETED	–	–	–	–	–	–	–	–
6. CRITICAL REVIEWS AND/OR TECHNOLOGY ASSESSMENTS COMPLETED	–	–	–	–	–	–	–	–
7 CURRENT AWARENESS AND PROMOTION EFFORTS		48	1,422	1,470	13,351	19,002	32,353	–
a. NUMBER NEWSLETTERS AND/OR ANNOUNCEMENTS PUBLISHED	8							
b. NUMBER MEETINGS, CONFERENCES, ETC SUPPORTED (g)	35							
8 OTHER	–	3,275	918	4,193	51,819	125,441	177,260	–
9 MANAGEMENT AND SUPPORT		834	533	1,367	28,378	43,782	72,160	
10 UNASSIGNABLE INDIRECT COSTS		–	–	–	–	49,461	49,461	
11. TOTAL		9,375	11,464	20,839	228,666	692,011	920,677	303,353.72

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Army Materials and Mechanics Research Center
Watertown, Massachusetts 02172
ANNUAL REPORT OF THE
MECHANICAL PROPERTIES DATA CENTER
H. Mindlin, H. Hucek, R. Gubiotti
Battelle-Columbus,
Columbus, Ohio

Technical Report AMMRC TR82-9
February 1982
Contract DLA900-79-C-0539
January 1 through December 31, 1981

AD ____________

UNCLASSIFIED
Unlimited Distribution

Key Words
Technical Information Center
DoD Information Analysis Center
Metals
High Strength Metals
Mechanical Properties
Information retrieval

This report summarizes MPDC activities for the period 1 January 1981 through 31 December 1981, a total of 12 months, under Contract DLA900-79-C-0539. It provides a summary of the scope, objectives and organization of MPDC, its information processing products, and services and a discussion of management objectives. The report focuses on the accomplishments and operation of the mechanical properties numeric database and the continuation of products and services of the Center.

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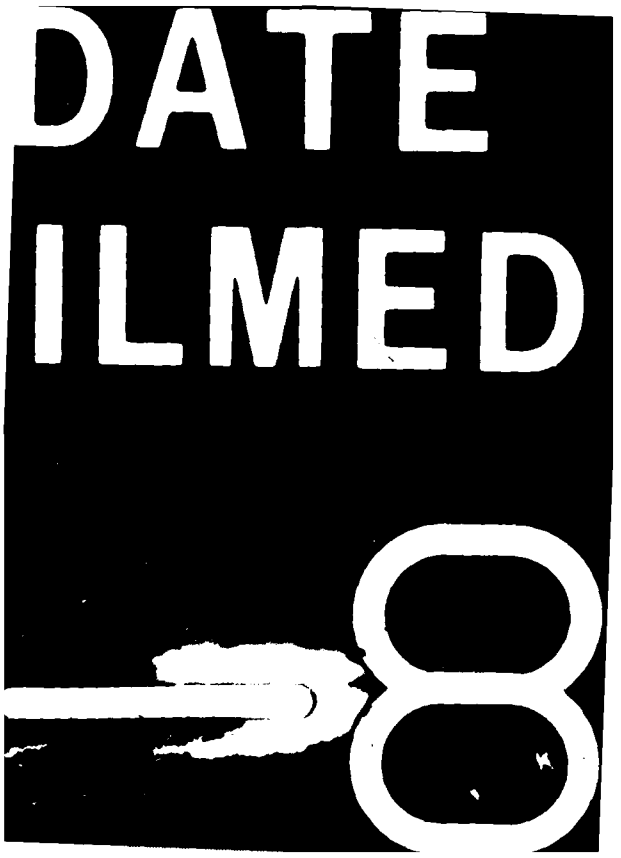
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